



California's Drought Update

April 30, 2010

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California's Drought Update

Photography: DWR

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Introduction

This drought bulletin provides a monthly update to California's water conditions. In the spring when seasonal precipitation typically declines statewide after March, there is increased interest in reservoir storage conditions and runoff forecasts to assess available water supplies. The total statewide October through March precipitation was 95 percent of average.

Information in the update is based on hydrologic data compiled through the end of March. This month's report includes: updated information on hydrologic and water supply conditions; comparisons to historical drought conditions; water supply allocations; and local drought impacts by hydrologic region. Additional drought information can be found on the drought website (<http://www.water.ca.gov/drought/>).

Hydrologic and Water Supply Conditions

Precipitation

The 2009 Water Year (October 1, 2008 through September 30, 2009) was the third consecutive year of below average precipitation for the state. Annual statewide precipitation totaled 76 percent, 72 percent, and 63 percent of average for Water Years 2009, 2008, and 2007, respectively.

Table 1 compares the average monthly contribution to statewide precipitation to the observed precipitation from Water Years 2009 and 2010 (to date). In Water Year 2009, January, April, July, August, and September were exceptionally dry while February, May, and June, were well above average. Water Year 2009 finished at 76 percent of an average water year. Water Year 2010 through March stands at 95 percent of average. In Water Year 2010, November was exceptionally dry while October and January were well above average. An above average precipitation for the month of January and a below average precipitation for the month of February and March has brought the WY 2010 average total slightly below normal.

Month of Water Year	Avg CA Precip (inches)	WY 2009 Observed	% of Average	WY2010 Observed	WY 2010 % of Avg
October	1.22	0.73	60%	2.07	169%
November	2.80	2.49	89%	0.77	28%
December	3.91	3.05	78%	3.33	85%
January	4.35	1.26	29%	6.55	188%
February	3.66	5.06	138%	3.40	93%
March	3.12	2.13	68%	1.96	63%
April	1.64	0.59	36%		
May	0.89	1.47	165%		
June	0.35	0.46	133%		
July	0.18	0.02	11%		
August	0.28	0.06	20%		
September	0.48	0.09	19%		
Total	22.88	17.40	76%	18.08	95%

Table 1. Average statewide precipitation by month with statewide precipitation values from Water Years 2009 and 2010. Data from California Climate Tracker (Western Region Climate Center):

http://www.wrcc.dri.edu/monitor/cal-mon/frames_version.html

Current equatorial sea surface temperature data indicates warm conditions above the El Niño threshold. These conditions are expected to continue through the Northern Hemisphere Spring 2010 based on the April 19 update by NOAA's Climate Prediction Center (CPC). The El Niño signal is decreasing, however, and is expected to transition to El Niño/La Niña neutral conditions by the summer. The current prevailing conditions may enhance the chances of increased precipitation throughout the upcoming spring months, although there have been several El Niño periods in recent decades that have produced drier than average statewide conditions. The CPC's April 15 1-month outlook for May and 90-day seasonal outlook suggests equal chances of above or below normal precipitation throughout California. The same forecast suggests an increased chance of above normal temperatures for all of California.

The Northern Sierra 8-Station and San Joaquin 5-Station Precipitation Indices track the wetness of the Sacramento and San Joaquin River basins. These indices help correlate the health of the runoff into Central Valley reservoirs. As of April 22, the 8-Station Index is at 104 percent of average to date with the 5-Station Index fairing slightly better at 111 percent of average to date. Note the precipitation for the 8-Station and 5-Station indices are close to and above the average annual precipitation, respectively. The annual average for the 8-Station Index is 50 inches and the 5-Station Index is 40.8 inches. Figures 1 and 2 show the current indices values compared to other Water Years.

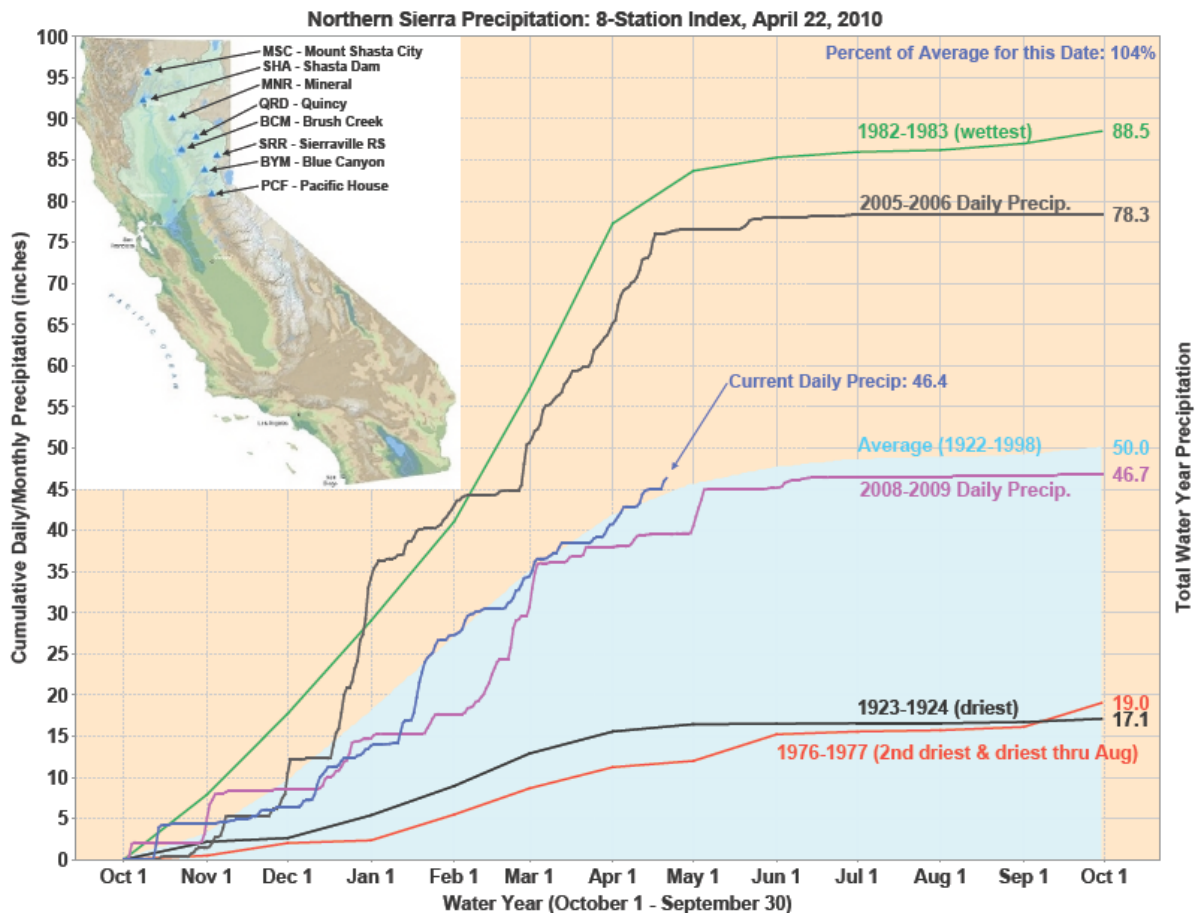


Figure 1. Northern Sierra 8-Station Precipitation Index

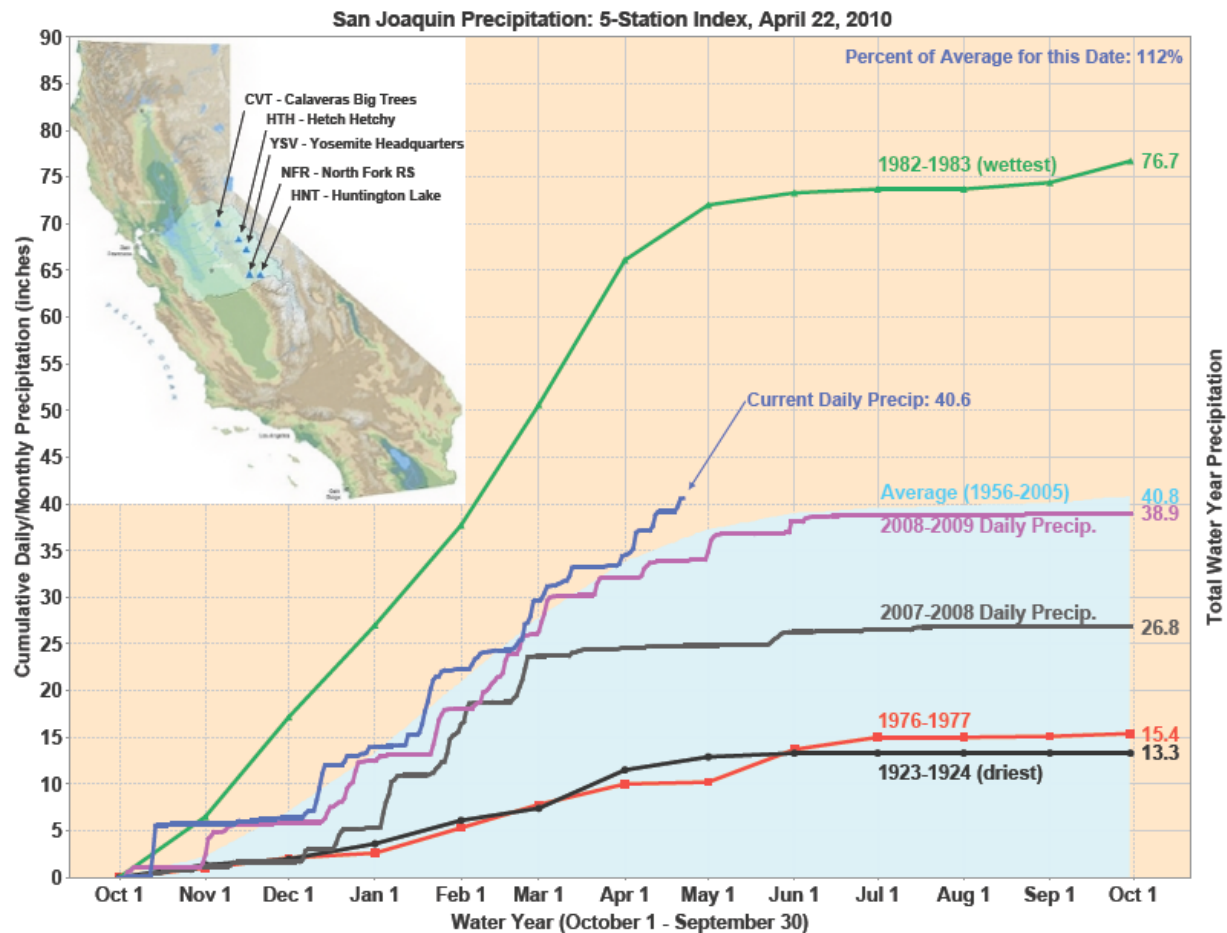


Figure 2. San Joaquin 5-Station Precipitation Index

Snowpack

As of April 20, 2010 the statewide snowpack stands at 31.6 inches, which is 123 percent of average to date and 111 percent of the average April 1 snowpack (typical date of maximum snow accumulation). During Water Year 2009, the snowpack peaked on March 25, 2009 at 25 inches, which was 88 percent of the average April 1 snowpack. During the last week, some mid to low elevation snow sensors indicate that melt has commenced; however, snowpack gains in April are still possible as shown by the gains in early April 2010.

Reservoir Storage

Statewide reservoir storage at the end of Water Year 2009 was over 17 MAF or about 80 percent of average and 46 percent of capacity for the date, with individual key reservoirs much lower. Statewide reservoir storage on April 22, 2010 was 18.2 MAF which is about 94 percent of average and 71 percent of capacity. Figure 3 shows the condition of the state's larger reservoirs as of midnight on April 21, 2010.

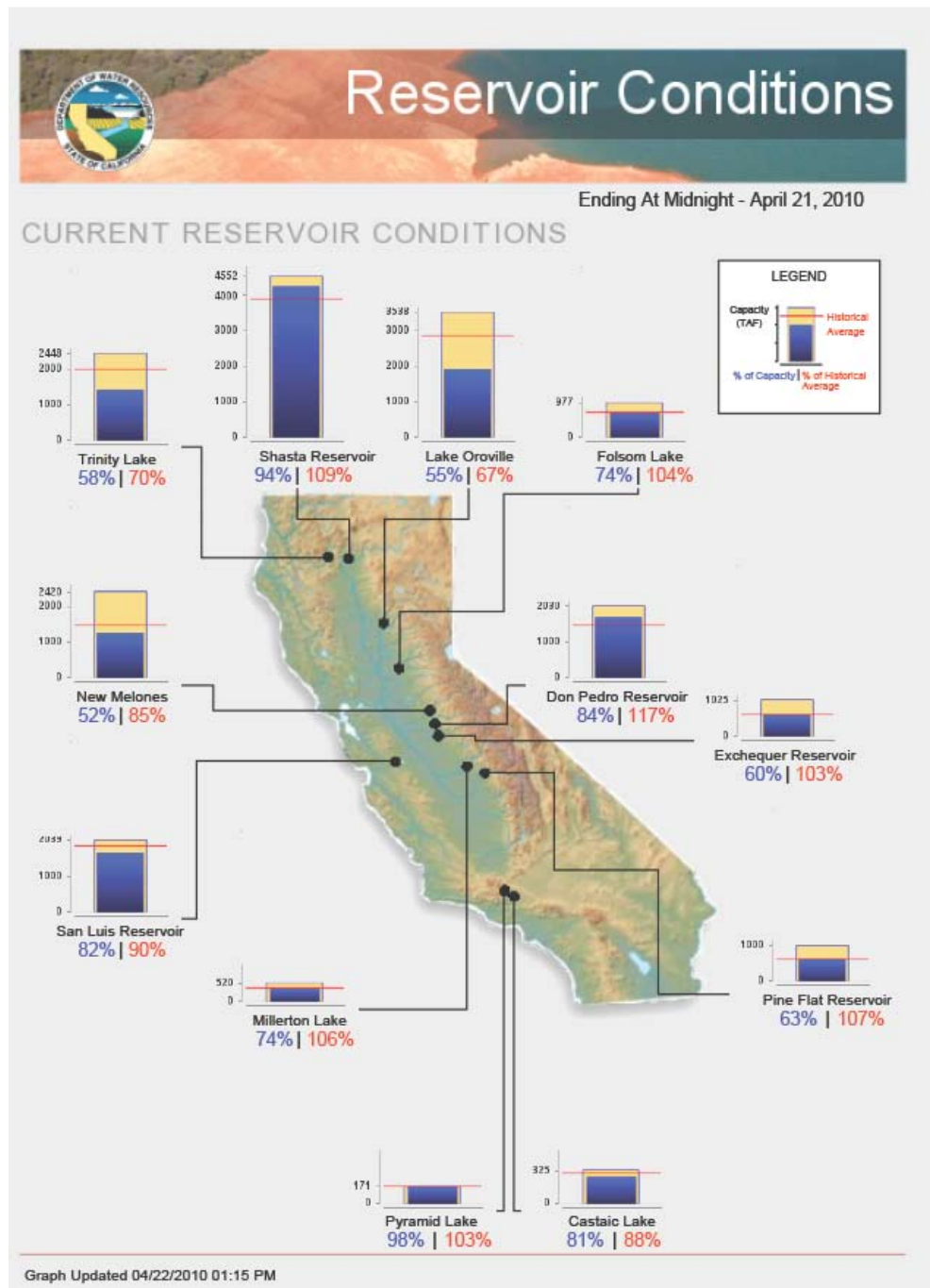


Figure 3. Reservoir storage for select reservoirs shown as percent of capacity (blue) and percent of average (red).

Source: <http://cdec.water.ca.gov/cgi-progs/products/rescond.pdf> or <http://cdec.water.ca.gov/cgi-progs/reservoirs/RES/>

Figure 4 shows detailed reservoir conditions at Lake Oroville, a major water supply for the state which is still well below average conditions and last year's storage at this time.

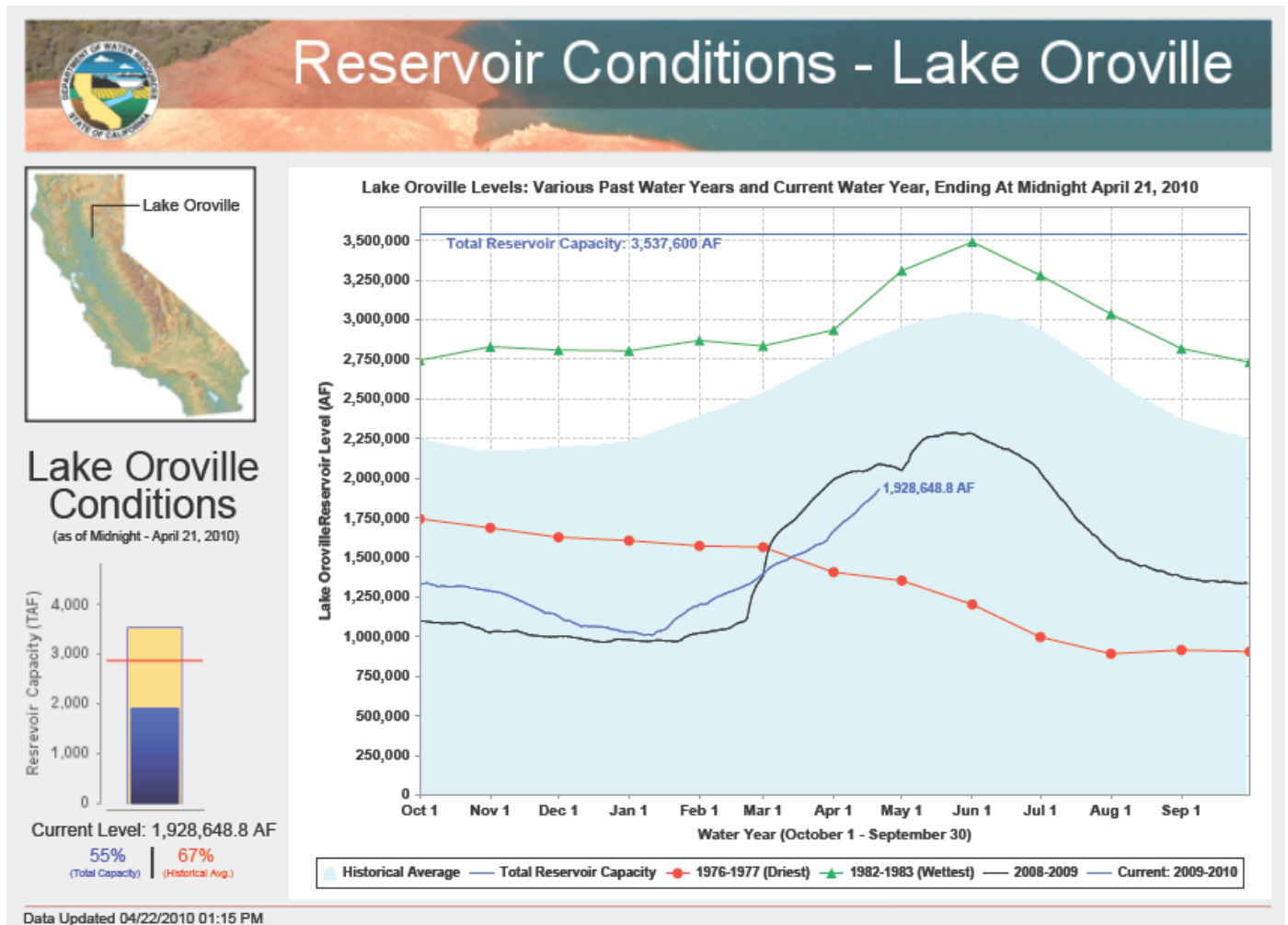


Figure 4. Detailed reservoir conditions for Lake Oroville.

Source: <http://cdec.water.ca.gov/cgi-progs/products/rescond.pdf> or <http://cdec.water.ca.gov/cgi-progs/reservoirs/RES/>



End of Water Year Key Reservoir Storage

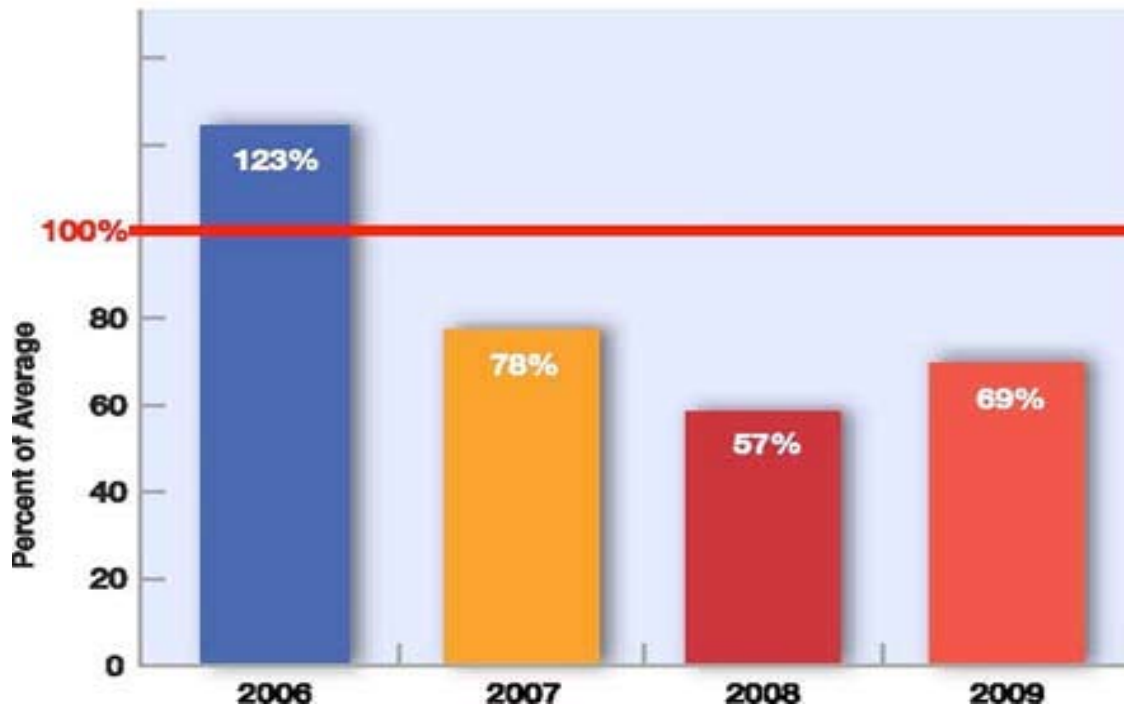


Figure 5. Percent of average end of water year storage for key reservoirs from 2006-2009. (“key reservoirs” comprise Trinity, Shasta, Oroville, Folsom, Don Pedro, New Melones, and San Luis reservoirs)

Figure 5 shows storage for key reservoirs for the end of the last four water years. The three-year drought, from 2007 to 2009, was evident in the well-below normal storage readings. The state entered the 2009-2010 Water Year with its key supply reservoirs at only 69 percent of average. As of April 22, 2010, the summation of storage in the “key reservoirs” was 91 percent of average.

Runoff

Figure 6 shows a comparison of the percent of average annual statewide runoff from Water Years 2006 through 2010 (the 2010 value includes only runoff from October through March and will be updated throughout the Water Year). Water Year 2006 was the most recent wet year in California, with 173 percent of average statewide runoff. Water Year 2007 was the first of three dry years, ending with 53 percent of average statewide runoff. Water Year 2010 stands at 66 percent of average to date (through March). A revised 2010 percent of average annual statewide runoff will be issued in early May for conditions through April and is expected to remain the same. Twelve major Sierra rivers are flowing at rates less than 80 percent of average from April 1 through April 18.

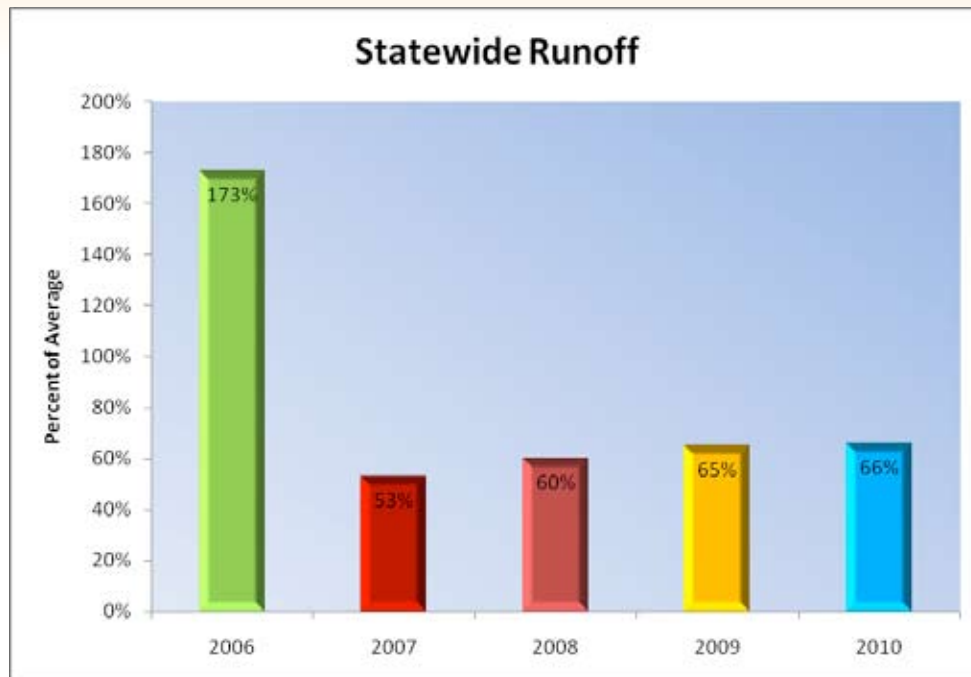


Figure 6. Statewide runoff for water years 2006, 2007, 2008, 2009 and 2010 (through March 31, 2010)

Table 2 shows the Sacramento and San Joaquin River Runoff, WSI and year type for select water years based on observed runoff. This table includes the April 1, 2010, forecasted Sacramento and San Joaquin River Runoff, WSI and Year Type.

Sacramento River / San Joaquin River

Water Year	Runoff MAF	Index	Year Type	Runoff MAF	Index	Year Type
2006	32.09	13.2	W	10.44	5.9	W
2007	10.28	6.2	D	2.51	2.0	C
2008	10.28	5.2	C	3.50	2.1	C
2009	12.91	5.8	D	4.97	2.7	BN
2010 ¹	13.90	6.2	D	5.30	2.9	BN

¹ April 1, 2010 forecast

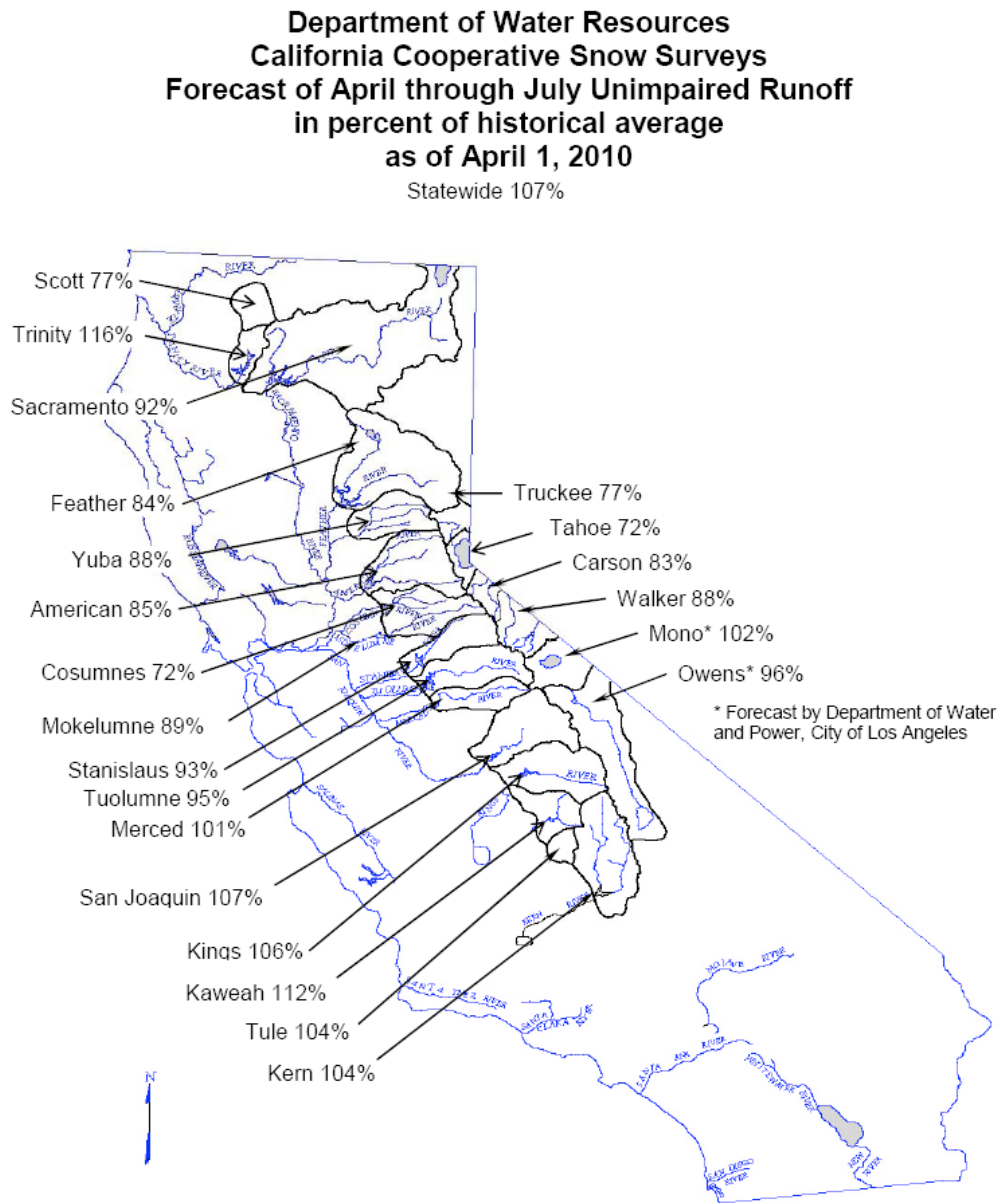
Table 2. Sacramento and San Joaquin river runoff, WSI, and year type for select water years based on observed data (W=wet, D=dry, C=critical, BN=below normal)observed data (W=wet, D=dry, C=critical, BN=below normal)

The Sacramento River Unimpaired Runoff was forecasted to be 13.9 million acre-feet (MAF) on April 1, 2010. The San Joaquin River Unimpaired Runoff was forecasted to be 5.3 MAF on April 1, 2010. Both estimates are likely to increase due to well above average precipitation and snow during early April in the Sacramento River and San Joaquin River basins. The updated runoff forecasts will be published in the May 1, 2010 DWR California Cooperative Snow Surveys Bulletin 120 and will be available on May 10, 2010.

<http://cdec.water.ca.gov/cgi-progs/iodir/wsi>



Figure 7 shows the forecast of April through July of unimpaired runoff as a percentage of historical average for selected Sierra river basins as of April 1, 2010. Most of the basins are forecast to have below normal runoff.



CDWR Hydrology JPS b120forecast map pg 1 4/22/2010 4:31 PM

Figure 7. April 1, 2010 April through July Unimpaired runoff percentage of historical average for California.

Source: <http://cdec.water.ca.gov/snow/bulletin120/b120apr10.pdf>

State Water Project Allocations

On April 23, 2010 the Department of Water Resources (DWR) increased anticipated 2010 State Water Project (SWP) deliveries to California's water contractors to 30 percent of requests, mainly due to Sierra storms in April. The SWP allocation had been set at 20 percent of contractors' requests earlier in April. The initial 2010 allocation estimate, made back in December 2009, was 5 percent. That projection rose incrementally as snowpack accumulated during winter and early spring. Later in May, DWR expects to make a final allocation announcement.

After three years of drought, low reservoir storage and fishery agency restrictions on Delta pumping continue to limit amounts of water that can be delivered to SWP contractors serving the Bay Area, San Joaquin Valley, Central Coast and Southern California. In 2009, the SWP delivered 40 percent of the amount requested by the 29 public agencies with long-term contracts to buy SWP water. The SWP contractors deliver water to about 25 million Californians and 750,000 acres of irrigated farmland. A notice to SWP contractors appears on DWR's State Water Project Analysis Office Web site at: <http://www.swpao.water.ca.gov/notices>.

DWR, in partnership with the Association of California Water Agencies, will continue to run the Save Our Water program. The program, which was created by Gov. Schwarzenegger's 2009 drought declaration, aims to educate Californians about easy ways to conserve water indoors and outdoors. Visit the Web site at: <http://www.saveourh2o.org>.

Central Valley Project Allocations

On April 15, 2010, the Bureau of Reclamation announced an increase in the Central Valley Project 2010 water allocation. The updated allocations are based on hydrologic conditions as they existed as of April 1, 2010, and the California Department of Water Resources (DWR) April 2010 snow survey and runoff forecast. The previous allocations were announced on March 16 and based on hydrologic conditions that existed as of March 1, 2010.

For CVP agricultural water service contractors north of the Delta, the water supply forecast increases from 50 percent to 100 percent, and the water supply forecast for Municipal and Industrial (M&I) water service contractors north of the Delta increases from 75 percent to 100 percent. For agricultural water service contractors south of the Delta, the water supply forecast increases from 25 percent to 30 percent, while the water supply forecast for M&I users south of the Delta remains at 75 percent allocation. The Class 2 water supply forecast for Friant Division contractors increases from 10 to 15 percent; the Class 1 water supply forecast for Friant Division contractors remains at 100 percent.

The allocations for the Eastside Division agricultural contractors (Stanislaus River), settlement contractors with claims to senior water rights along the Sacramento and San Joaquin Rivers, and Wildlife refuges allocation (Level 2 water) north and south of the Delta remain at 100 percent. The increases result from additional precipitation, improved snowpack, and improved storage levels in Shasta Reservoir and the Federal share of San Luis Reservoir. Additionally, improved inflow to Millerton Lake has led to the increase in Friant Division supplies.

Detailed information about the initial 2010 Central Valley Project water supply forecast, can be found at <http://www.usbr.gov/mp/pa/water>.



Local Impacts and Responses to the Drought

Based on the results of economic forecast models used by DWR which used SWP and CVP deliveries announced as of April 23, 2010, as well as current assumptions about local water conditions, no shortage-related losses to irrigated agriculture are expected in the Sacramento Valley. Reduced SWP and CVP deliveries are expected to bring about job and income losses in San Joaquin Valley in 2010, however. An estimated 6,900 to 8,900 jobs will be lost, with income losses between \$486 and \$619 million. These employment and income losses include those arising from impacts on businesses in the San Joaquin Valley both directly and indirectly related to farm production. Furthermore, groundwater pumping costs are forecasted by DWR modeling to increase between \$109 and \$115 million as San Joaquin Valley farmers substitute groundwater for the unavailable SWP and CVP supplies. For both the Sacramento and San Joaquin Valleys, these estimates exclude any losses associated with crop planting decisions made based on earlier much more unfavorable forecasts of SWP and CVP deliveries and assumptions about local water supply conditions. These estimates also exclude any losses associated with drought-affected dryland range and pasture, unirrigated crops, livestock operations, and dairies.

North Coast Hydrologic Region — Drought conditions in the Klamath Basin have severely impacted Klamath Project water users in both Oregon and California. The Klamath Basin is in the midst of a dry hydrologic cycle that is placing a premium on water optimization to meet the Department of Interior's Endangered Species Act (ESA) and Tribal Trust requirements while also potentially allowing for the release of water for project purposes. In looking at the upcoming 2010 water year, the Bureau of Reclamation has first taken into account the needs of these ESA listed species and tribal trust in Upper Klamath Lake, Klamath River, and Clear Lake and Gerber Reservoirs, while also meeting the needs of the downstream fishery.

After meeting these legal requirements, Reclamation has determined that there will be sufficient water to make limited project releases from Upper Klamath Lake and Gerber Reservoir. The 2010 operations plan estimates 30 to 40 percent of average annual releases or approximately 150,000 acre-feet of water will be available to Upper Klamath Lake irrigators. The releases will begin once the lake level reaches a level protective of endangered suckers and is expected to remain above that level for the remainder of the irrigation season. It is expected that irrigation releases may begin sometime after the middle of May.

In addition to project releases, Reclamation has dedicated \$5.25 million in federal FY 2010 funds to the Klamath Water and Power Agency (KWAPA) to implement a ground water pumping program (often referred to as the "Water Bank") and land idling program. KWAPA expects the Water Bank to support groundwater pumping of at least 50,000 acre-feet. The combination of surface water releases and groundwater pumping will reach close to 50 percent of typical annual project releases.

More information on the Klamath Project, including drought response actions can be found at <http://www.usbr.gov/mp/kbao>.

San Francisco Bay Hydrologic Region — Total reservoir storage continues to improve, with most reservoirs at or near capacity. The Marin Municipal Water District (MMWD) reported that on April 3, water began flowing over the spillway at Kent Lake, the last of the district's seven reservoirs to reach 100 percent capacity. This is the first time in four years that all of the district's reservoirs have been full. Even though this means there will be no rationing this summer, MMWD is encouraging its customers to continue to conserve because 75 percent of their water supply comes from reservoirs and there is uncertainty about water conditions next year. Storage in Santa Clara Valley Water District reservoirs increased in April to about 75 percent of capacity and East Bay Municipal Utility District reservoirs are at about 86 percent full as of April 21, 2010. Storage in Lake Mendocino, a water supply for Sonoma County Water Agency, is above its historical average or about 100,600 acre-feet as of April 21.

Sacramento River Hydrologic Region — Water availability from Clear Lake has significantly improved for the Yolo County Flood Control and Water Conservation District; however, as of April 9, 2010 the District is waiting for improvements to inflows into Indian Valley Reservoir before deciding on whether to declare an unallocated irrigation season. Indian Valley Reservoir is about 30 percent of capacity as of April 21, 2010.

North Lahontan Hydrologic Region — Lake Tahoe's water level has remained above its natural rim (elevation 6223 feet) since January 24 and is at 6223.47 as of April 21. The April 1 unimpaired runoff forecast for Lake Tahoe is that its water level would rise about one foot from April 1 to July 31 or about 72 percent of average.

South Coast, South Lahontan, and Colorado River Hydrologic Regions — Even with the above average seasonal precipitation this winter and spring, Southern California reservoir levels have not improved significantly. The water storage in Metropolitan Water District's Diamond Valley Lake reservoir with a capacity of 810,000 acre-feet dropped one percent from the previous month and is only 47 percent full as at April 20, 2010. The combined storage of 25 surface reservoirs operated by member agencies of San Diego County Water Authority remain virtually unchanged from the previous month at 55 percent of capacity as ongoing regulatory restrictions on water deliveries from Northern California and three years of very dry conditions continue to impact the region's supply. The region's water managers are telling consumers to be prepared for another year of limited water supplies and reminding residents and businesses to continue practicing water conservation and follow local water use restrictions.

The campaign for reduced water demand continues to be successful as urban water use in the region remains down. In the San Diego area, the latest data from July 1, 2009 through February 28, 2010 show urban water use decreased about 13 percent compared to the same period a year earlier. The Municipal Water District of Orange County which has been tracking monthly water usage since mandatory reductions were imposed in July, 2009 reports that overall, water use in the county is below the reduction target by about 10 percent. As part of efforts aimed at increasing local supplies, the Water Replenishment District of Southern California is moving forward on the implementation of a series of hydrological projects including projects that capture rainwater to increase reserves and the Groundwater Improvement Reliability Program that treats recycled water to a much cleaner level.



Water Conservation Actions by Local Water Agencies

As of March 30, 2010, there are 67 local water agencies in California that have mandated water conservation and 56 water agencies urging voluntary conservation measures. This is unchanged from the previous month. A current update of the number of agencies mandating conservation and urging voluntary conservation measures can be found at the Association of California Water Agencies (ACWA) website, <http://www.acwa.com/issues/cadrought/>

Summary

While precipitation and snowpack conditions statewide are near or above average and storage in most reservoirs have improved from the previous water year, statewide runoff through March continues to be significantly below average in Water Year 2009-2010 at 66 percent. Storage at Lake Oroville, a major water supply reservoir for the State, increased in April but remains low at 67 percent of average. The April 1, 2010 forecast indicates below average runoff from April through July for the Sacramento River and San Joaquin River basins, however above average precipitation and snow during early April will likely improve runoff forecasts when estimates are made for the conditions existing on May 1, 2010. As a result of improved water supply conditions, both the Central Valley Project and State Water Project increased their water delivery allocations in April.



Photography: DWR

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